

# Testing Mineral Hardness

Read the texts and answer the questions.

Hardness is one of the properties that can be used to describe and identify minerals. The hardness of a mineral is its ability to resist scratching.

Friedrich Mohs was a German scientist who studied minerals. More than 100 years ago, he developed a hardness scale. The Mohs Scale of Hardness is used to describe the hardness of minerals using numbers. Any mineral's hardness can be determined by attempting to scratch it with the index minerals listed in the scale.

Talc is the softest mineral. It has a hardness of 1 on the scale. Diamond is the hardest mineral, and it has a hardness of 10.

1. What is the purpose of the Mohs Scale of Hardness?
2. If quartz scratches gypsum, what can you infer about quartz and what can you infer about gypsum?
3. Identify the hardness for the 10 index minerals in the Mohs Scale of Hardness. Write each mineral on the chart beside its corresponding hardness number. First use the text above to add talc and diamond to the chart. Then use the information in the "What Scratches What" box to correctly add the other 8 minerals to the chart.

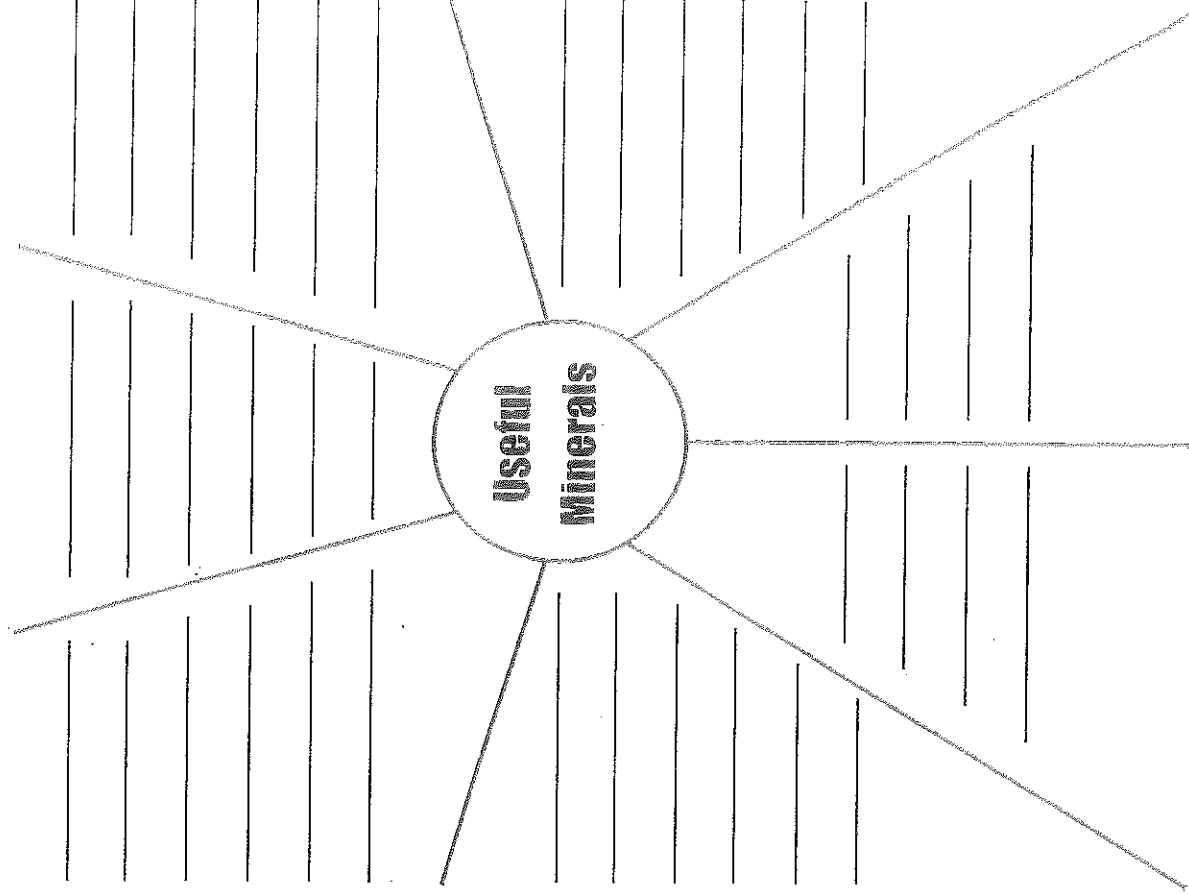
Mohs Scale of Hardness	
Hardness	Index Mineral
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

## What Scratches What?

- Everything scratches calcite, except gypsum and talc.
- Fluorite scratches gypsum and calcite but not apatite.
- Corundum scratches everything except diamonds.
- Feldspar scratches apatite, and quartz scratches feldspar.
- \* Topaz scratches quartz but not corundum.

# Useful Minerals

Use online resources to research how people use minerals. Then complete the graphic organizer by identifying several minerals and explaining their usefulness.



# What Are Minerals?

Read the text and answer the questions.

Minerals are naturally occurring, inorganic materials that have definite physical and chemical properties. A mineral always has the same chemical and physical properties. Therefore, geologists can classify minerals by their chemical and physical properties. Minerals are also usually solid and have a crystal structure. This means the atoms that compose minerals have an orderly, repeated pattern. Physical properties of minerals include hardness, luster, color and several other descriptive characteristics.

Minerals are made of nonliving matter called chemical elements. A chemical element is a substance that cannot be broken into any simpler substance. Chemical elements are the building blocks of all minerals. Sometimes a mineral is made up of just one chemical element. Most of the time, however, a mineral is a combination of two or more chemical elements.

Salt, for example, is a combination of the chemical elements sodium and chlorine. When chemically joined, sodium and chlorine form salt crystals. Salt occurs naturally—you can find it in the ocean or in large chunks of “rock salt” formed by the Earth. It has a white color and low luster, and it is relatively soft. It also has a very strong flavor!

1. A. Use the text to define minerals and chemical elements.  
B. Explain why chemical elements are the “building blocks” of minerals. Cite evidence from the text to support your answer.
2. A. Identify at least three physical properties of minerals  
B. Describe at least three physical properties of salt.
3. Match the following questions to whether they are best answered by paragraph 1, 2, or 3 of the text.  
A. \_\_\_\_ How do scientists classify minerals?  
B. \_\_\_\_ What are minerals made of?  
C. \_\_\_\_ What are minerals?
4. What properties do scientists use to classify minerals? Why?

# Properties of Minerals

Read the text and answer the questions.

Minerals can be identified and described based on their properties.

Color is one of the most common ways to describe minerals. However, it is not always the best way. A single mineral may appear in a variety of colors. Also, a mineral can tarnish or oxidize, meaning its color can change when its surface is exposed to moisture and air. The intensity of color can be dark, very dark, light, pale, deep, dull, shiny, or bright. Adjectives like streaked, splotchy, mottled, speckled, layered, or banded are ways to describe the distribution of color in a mineral.

Luster is the way a mineral reflects light. Minerals can be described as metallic (gold, bronze, copper, and silver), pearly, glassy, silky, greasy, brilliant, or dull.

Cleavage is when certain minerals break in a definite way. For example, mica cleaves (breaks) into thin sheets, galena cleaves into little cubes, and feldspar cleaves into little steps.

Streak is the color of powder left when a mineral is scraped across a hard, rough surface like a bathroom tile. It is not unusual for minerals of one color to leave streaks of a different color.

Specific gravity of a mineral is its relative weight compared to the weight of an equal volume of water. Specific gravity determines the density of the mineral.

1. A. What is the disadvantage of using color to identify minerals?  
B. What can you infer about the use of color as a way to describe minerals based on the color-descriptive adjectives listed in the text?  
C. What is the relationship between a mineral's color and its streak?
2. What can you infer about the luster of a metallic mineral?
3. How would you test the cleavage of a mineral?
4. What is the relationship between specific gravity and density?
5. Use an online resource to identify three different minerals. Organize the photographs in a visual presentation, and identify the properties of each mineral. Share your presentation with your class.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Period: \_\_\_\_\_

## TREASURES IN THE EARTH

Did you know that earth's crust is loaded with minerals-some of them common, some of them very rare? Even those that don't cost hundreds or thousands of dollars are valuable and useful. All minerals are natural, inorganic solids, which have interesting crystalline structures. Minerals are usually identified by certain physical properties such as hardness, streak, luster, fracture, cleavage, smell, and taste.

We need your help! Ms. Smith's science classes have decided that you can actually find minerals right in your own backyard. In that case, they decided to go on a scavenger hunt to see how many different minerals they could find around the school. Follow along to see if you can figure out the names of the minerals that were found using "Moh's Hardness Scale" and the chart, "Physical Properties of Some Common Minerals". Good luck! We need all the help we can get!

1. Jordan and Emily found a mineral that is colorless, scratches gypsum but not fluorite. It leaves a colorless or white streak, breaks in 3 directions, has a nonmetallic luster, and causes a double image. What is it? \_\_\_\_\_
2. Ashley's favorite mineral is gray and leaves a gray or black streak. It has a metallic luster. It can be scratched by a fingernail but not a nail, and it breaks in a clean cubic pattern. What is her favorite mineral? \_\_\_\_\_
3. The mineral that Austin and Dalton found is brassy, leaves a greenish black streak, and breaks unevenly. It cannot scratch quartz, but it can scratch orthoclase. It also has metallic luster. What is it? \_\_\_\_\_
4. Meanwhile in the schoolyard, Tyler and Devin found a colorless chunk that breaks apart in cubes. It has a nonmetallic luster and is soft enough to be scratched by a fingernail but cannot be scratched by a penny. It does not scratch calcite. What is it? \_\_\_\_\_
5. Hannah has a handful of whitish-gray stones with a nonmetallic luster that leave a colorless streak. She found these out in front of the school. They can be scratched by a steel file but not by a knife. What does she have? \_\_\_\_\_
6. Both Cody and Parker have found samples of a red mineral on the softball field, which leaves a gray streak. It can be scratched with a fingernail and with a penny, and it can be easily cut with a knife. What is it? \_\_\_\_\_
7. Zariyah and Laura are holding a very soft mineral that leaves black "grease" on their fingers. It makes a black streak and has a shiny luster. What is it? \_\_\_\_\_
8. The mineral that Emma and Cameren found was colorless but they learned in class that it can come in many colors. Its streak is colorless and it has a hexagonal crystalline structure. It can scratch a steel file. What was it? \_\_\_\_\_
9. The next mineral that Malik and Malique found is what many jewelry pieces are made out of. It is golden in color and has a yellow streak. Depending on the softness of the mineral, so of it can be scratched by a fingernail while others can be cut easily with a knife or nail or could be scratched by a penny. What is it? \_\_\_\_\_
10. Sydney and Kelsi are especially excited about a find of a whitish mineral that glows when they put it under an ultraviolet light. It leaves a colorless streak and cannot be scratched with a penny, but can be scratched with a knife. What might it be? \_\_\_\_\_
11. Joe and Kenny have picked up a mineral near the track, which feels soapy and leaves a white, powdery residue on their hands. It is very soft and flakes off. What have they probably found? \_\_\_\_\_
12. A brown mineral that leaves a brown streak is in Sarah's book bag. It fractures irregularly and can be scratched by a steel file but not by a knife. It has a metallic luster. What might it be? \_\_\_\_\_
13. The mineral that Chase and Grant found by the sidewalk has the special property known as magnetism. This mineral attracts objects that have iron in them. It has metallic luster, but its streak and color is black. Its crystalline structure is cubic and it can be scratched by a steel file. What did they find? \_\_\_\_\_
14. The next mineral that Emma and Cameren found was colorless but they learned in class that it can come in many colors. Its streak is colorless and it has a hexagonal crystalline structure. It can scratch a steel file. What was it? \_\_\_\_\_
15. The mineral that Chase and Grant found by the sidewalk has the special property known as magnetism. This mineral attracts objects that have iron in them. It has metallic luster, but its streak and color is black. Its crystalline structure is cubic and it can be scratched by a steel file. What did they find? \_\_\_\_\_
16. Ms. Smith was happy when Lauryn found this mineral. She wears a lot of it as jewelry. It has a silvery color and its streak can be light gray to silver. What mineral was Ms. Smith so happy about finding? \_\_\_\_\_



17. The next mineral that Ryan found on the scavenger hunt around school was really hard. It is almost as hard as a diamond according to Moh's hardness scale. It can be found in three different colors, such as blue, brown, and even colorless. What did he find? \_\_\_\_\_

18. Shawn and Jake were hoping to make some money on the mineral that they found because it is considered a gemstone. This means that it is rare and can be cut by a gemologist. It can come in many colors such as white, pink, yellow, and blue. The one they found was colorless. This mineral can scratch quartz. What is it? \_\_\_\_\_

19. Everyone in class knew what the next mineral was because we have looked at it in class before. It can be yellow-red, green, or black. It has a colorless streak. It also can scratch a steel file but cannot scratch quartz. What is it? \_\_\_\_\_

20. Julian and Julia found the last mineral. It was difficult for them to spot it in the clay because it has a copper red color. Using a porcelain tile, they noticed that the streak color was also copper red. It does have a metallic luster. What was the last mineral found? \_\_\_\_\_